Osada Declaration under 37 C.F.R. § 1.132

Docket No.: 0599-0215PUS1
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Shunichi OSADA et al.

Application No.: 10/575,777 Confirmation No.: 3791

Filed: January 9, 2007 Art Unit: 1794

For: LAMINATED FILM Examiner: M. B. Nelson

DECLARATION UNDER 37 CFR 1.32

Commissioner for Patents
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Sir:

I, Syunichi Osada, residing at 10-28, Nishikori 3-chome, Otsu-shi, Otsu, 520-0027 Japan, do declare and state as follows:

1. I am a co-inventor of this invention disclosed in above-identified U.S. application and hence I am fully familiar therewith.

2. I am an engineer having eared master's degree of engineering from the Gifu university graduate school of engineering in March 1995 and have been employed by TORAY INDUSTRIES INC. of 1-1, Nihonbashi-Muromachi 2-chome, Chuo-ku, Tokyo, 103 Japan since April 1995 and I have been engaged mainly in research and development on multilayer film and polyester film manufacturing process.

3. I have reviewed the above-identified application, the USPTO Office Action dated July 21, 2009 which issued in connection with the above-identified application, and the Schrenk '820 reference (US Patent No. 5,612,820).

4. Based on my background in optics and polarization, it is my opinion that the vertical y-axis of Figure 1 of Schrenk '820 indicating "REFLECTANCE (%)" refers to a range of 10-90%, not "1.0-9.0%" as labeled. Thus, it appears to me that the reflectance ranges exhibited by the evaluated polarizer as shown in Figure 1 extend from just above about 5% to as high as about 50%. These corrected y-axis reflectance ranges for the evaluated polarizer in Figure 1 of Schrenk '820 are evident based on the following analysis.

5. Taking into consideration the reflectance properties at the surface of an object, it is necessary to consider the "Fresnel reflection". The Fresnel equations describe the behavior of light when moving between media of differing refractive indices and predict the Fresnel reflection. In the present situation, the differing media having different refractive indices include the atmosphere (i.e. air) and the polymer constituting the film.

6. The equation for calculating the lowest Fresnel reflection value that is observed for incident light perpendicular to the surface is as follows:

$$\text{Fresnel Reflectance (\%)} = (nA-nB)^2 / (nA+nB)^2 * 100$$

wherein nA is the refractive index of medium A and nB is the refractive index of medium B.

7. In Example 1 of Schrenk '820, the polymer constituting the surface of the film is polycarbonate or polystyrene and its refractive index is estimated to be at least 1.585 (i.e. 1.6 - 0.03/2). Because the refractive index of air is 1.0, the calculated Fresnel reflectance of the film of Example 1 of Schrenk '820 is approximately 5.12%. Note that this calculation result corresponds only to the reflectance at the surface of the film. Consequently, based on the above assumptions, it is theoretically impossible for the reflectance of the film of Example 1 of Schrenk '820 to fall below 5.0%.

8. In view of the above theoretical calculations, it is my opinion that the y-axis of Figure 1 of Schrenk '820 cannot be on a scale of 1.0-9.0%, since the depicted reflectance ranges would

both fall well below 5.0% which is below the theoretically lowest value based on the Fresnel equations as discussed above.

9. On the other hand, it is my opinion that the y-axis scale of Figure 1 of Schrenk '820 very likely corresponds to 10-90% for the following reasons. Schrenk '820 discloses at col. 9, lines 3-6 that, "As can be seen from the graph of FIG. 1, reflectance differences in the parallel and perpendicular planes over a wide range of wavelengths demonstrate that the film was functioning to polarize light." Thus, the question becomes whether the film of Example 1 of Schrenk '820 would function sufficiently as a light polarizer taking into account the most appropriate interpretation of the scale of the y-axis in Figure 1.

10. The "polarization degree" of a light polarizer is an index of performance of the light polarizer at a wavelength of 575 nm, which is a wavelength wherein major reflectance deference is observed between the light parallel to stretch and the light perpendicular to stretch. The polarization degree is calculated by the manner disclosed in "Optics (4th Ed)", Eugene Hecht, Addison Wesley (see Equation (8.30) of page 350). The film of Schrenk '820 is basically transparent as noted at col. 1, lines 66-67. Attempting to employ the labeled y-axis reflectance scale of 1.0-9.0%, the transmittance of the light parallel to stretch would be about 94.9 % (100 - 5.1%) and the transmittance of the light perpendicular to stretch would be about 97.8% (100 - 2.2%) in accordance with Figure 1. The polarization degree of the film in Figure 1 would be calculated to be only 0.015 (i.e. (97.8 - 94.9) / (97.8 + 94.9)). This calculated polarization degree is very low, and would be completely insufficient for one to conclude that the film would "function to polarize light" as stated in Schrenk '820. As shown in the text book above, 40% of polarization degree is evaluated as "partially polarized" and 0% of polarization degree is obviously evaluated as "unpolarized".

11. On the other hand, if the y-axis scale of Figure 1 of Schrenk '820 is interpreted to have a scale of 10-90%, the polarization degree would be calculated to be about 0.228, (i.e. (78 -

49) / (78 + 49)). This calculated polarization degree would lead one to conclude that the film evaluated in Schrenk '820 would function to partially polarized light.

12. In addition to the above observations, I also note that because the reflectance of the light parallel to stretch at the wavelength 575 nm of the film of Schrenk '820 is correctly interpreted to be over 50%, it is not possible for the maximum light ray reflectivity of the film in a wavelength range of 400 to 2500 nm to fall below 25% if unpolarized light is used. In this regard, note that reflectance at 575 nm of the film of Schrenk '820 is about 36.5%, since (51+22)/2=36.5%.

13. In view of the above, it is my opinion that the reflectance y-axis of Figure 1 of Schrenk '820 is labeled incorrectly as having a scale of 1.0-9.0%, rather than the correct scale of 10-90%.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

November 12, 2009
Date

Syunichi Osada
(Signature of Inventor or qualified person)